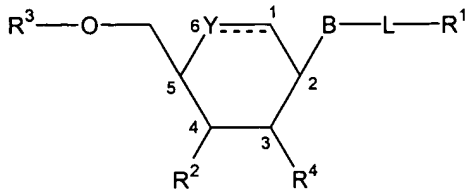
What is claimed is:

1. A compound having the formula



wherein L is a linking moiety;

B is a heterocyclic base;

R^1 is selected from the group consisting of a protecting group, a label, a solid phase, and –H;

R^2 is selected from the group consisting of –H and -OR^6;

R^3 is selected from the group consisting of a protecting group, a linking moiety covalently coupled to a solid phase, a phosphoramidite, an H-phosphonate, and a triphosphate;

R^4 is selected from the group consisting of –H, –OH, alkyl, halogen, -O-R^5, -S-R^5, NR^5R^{5a}, a label, and a linking moiety covalently coupled to a solid phase;

R^6 is selected from the group consisting of -H, a protecting group, a linking moiety covalently coupled to a solid phase, a phosphoramidite, and a H-phosphonate;

Y is selected from the group consisting of O, S, NR^5, $CR^{5a}R^{5b}$, and CR^{5a}, and the bond between the C-1 atom of the six-membered ring and Y is a single bond when Y is O, S, NR^5, or $CR^{5a}R^{5b}$ and a double bond when Y is CR^{5a}; and

R^5 is selected from the group consisting of alkyl, alkenyl, alkinyl, aryl, acyl, a protecting group, and –H, and R^{5a} and R^{5b} are selected from the group consisting of alkyl, alkenyl, alkinyl, aryl, acyl, and –H.

2. The compound according to claim 1 wherein the linking moiety L comprises carbon, oxygen or nitrogen atoms and a reactive group.

3. The compound according to claim 1 wherein R1 is a label selected from the group consisting of a dye and a hapten.

4. The compound according to claim 3 wherein R1 is a dye selected from the group consisting of a fluorescein dye, a rhodamine dye, a cyanine dye, a coumarin dye, and an azo dye.

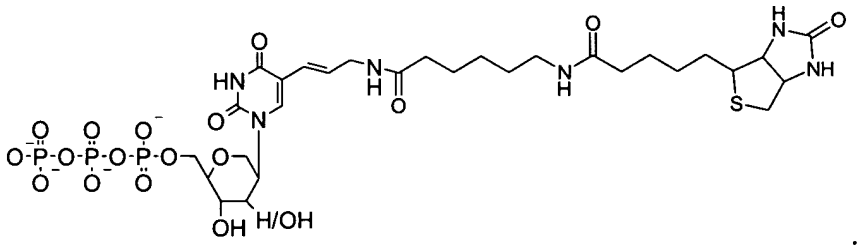
5. The compound according to claim 3 wherein the hapten is biotin.

6. The compound according to claim 1 wherein Y is CR^{5a} and R^{5a} is selected from the group consisting of alkyl, alkenyl, alkinyl, aryl, acyl, and –H.

7. The compound according to claim 1 wherein Y is selected from the group consisting of O, S, and $CR^{5a}R^{5b}$.

8. The compound according to claim 1 wherein R^3 is a triphosphate, R^2 is $-OR^6$ wherein R^6 is -H, and R^4 is –H or -OH.

9. A compound having the formula:



10. The compound according to claim 1 wherein R^2 is $-OR^6$ wherein R^6 is a phosphoramidite and R^3 is a protecting group or a solid phase covalently coupled to a linking moiety.

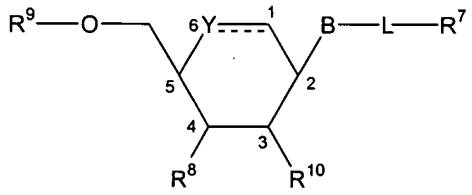
11. An oligomeric compound comprising a monomeric unit having the formula:

$$S\text{-}B\text{-}L\text{-}R^7$$

wherein S is a moiety comprising a six-membered ring, B is a heterocyclic base, L is a linking moiety, and R^7 is selected from the group consisting of a label, a protecting group, and a solid phase.

12. The compound according to claim 11 wherein the six-membered ring is a derivative selected from the group consisting of cyclohexane, cyclohexene, tetrahydropyran, tetrahydrothiopyran, and piperidine.

13. An oligomeric compound comprising a monomer having the formula:



wherein L is a linking moiety and B is a heterocyclic base;

R^7 is selected from the group consisting of a protecting group, a label, and a solid phase;

R^8 is selected from the group consisting of –H and $–OR^{11}$;

R^9 and R^{11} are selected from the group consisting of –H, a linking moiety covalently coupled to a solid phase, a phosphate, a phosphodiester with a nucleotide, a modified nucleotide, an oligonucleotide, and a modified oligonucleotide;

R^{10} is selected from the group consisting of –H, –OH, alkyl, halogen, $-O-R^5$, $-S-R^5$, NR^5R^{5a}, a label and a linking moiety covalently coupled to a solid phase;

Y is selected from the group consisting of O, S, NR^5, $CR^{5a}R^{5b}$, and CR^{5a}, and the bond between the C-1 atom of the six-membered ring and Y is a single bond when Y is O, S, NR^5, or $CR^{5a}R^{5b}$ and a double bond when Y is CR^{5a}; and

R^5 is selected from the group consisting of alkyl, alkenyl, alkinyl, aryl, acyl, a protecting group, and –H and R^{5a} and R^{5b} are selected from the group consisting of alkyl, alkenyl, alkinyl, aryl, acyl, and –H.

14. The compound according to claim 13 wherein the heterocyclic base is selected from the group consisting of adenine, guanine, cytosine, thymine, uracil, and methyl-cytosine.

15. The compound according to claim 13 wherein the linking moiety L comprises carbon, oxygen or nitrogen atoms and a reactive group.

16. The compound according to claim 13 wherein R^7 is a label selected from the group consisting of a dye and a hapten.

17. The compound according to claim 16 wherein the dye is selected from the group consisting of a fluorescein dye, a rhodamine dye, a cyanine dye, a coumarin dye, and an azo dye.

18. The compound according to claim 16 wherein the hapten is biotin.

19. The compound according to claim 13 wherein R^8 is $-OR^{11}$, R^9 and R^{11} are an oligonucleotide or a modified oligonucleotide, and R^{10} is –H or -OH.

20. The compound according to claim 13 wherein Y is selected from the group consisting of O, S, and $CR^{5a}R^{5b}$.

21. The compound according to claim 13 wherein Y is CR^{5a} and R^{5a} is selected from the group consisting of alkyl, alkenyl, alkinyl, aryl, acyl, and –H.

22. A composition for analyzing interactions between target nucleic acids and oligomeric compounds comprising an array of a plurality of oligomeric compounds having different sequences wherein the oligomeric compound is an oligomeric compound according to claim 13 wherein a solid phase is covalently coupled to a member of the group consisting of R^7, R^9, R^{10}, and R^{11}.

23. Use of a compound according to claim 1 wherein R^2 is $-OR^6$ and R^3 and R^6 are selected from the group consisting of phosphoramidite, a solid phase covalently coupled to a linking moiety, and a protecting group for synthesis of a compound according to claim 11 or 13.

24. Use of a compound according to claim 1 for labeling nucleic acids.

25. Use of a compound according to claim 11 or 13 or a composition according to claim 22 in a hybridization reaction with a complementary nucleic acid.

26. Use of a compound according to claim 11 or 13 as a member selected from the group consisting of primer, probe, and capture probe.

27. A method for chemical synthesis of a compound according to claim 11 or 13 comprising the steps of:

(a) providing a compound according to claim 1 wherein R^2 is $-OR^6$ and R^6 is phosphoramidite and R^3 is a protecting group,

(b) providing an -OH group of a nucleoside or a modified nucleoside bound to a solid phase by another -OH group, or providing an -OH group of an oligonucleotide or a modified oligonucleotide bound to a solid phase by another -OH group of the nucleotide or modified nucleotide at the 3'-end of the oligonucleotide or the modified oligonucleotide,

(c) reacting the phosphorous atom of the phosphoramidite with the free OH group to form a phosphite ester and oxidizing the phosphite ester to a phosphotriester,

(d) optionally reacting any unreacted -OH group of step (c) with another compound to prevent any further reactions of the unreacted 5'-OH group of step (c) in the following steps,

(e) optionally repeating steps (c) to (d) with phosphoramidite derivatives of nucleosides, modified nucleosides or a compound according to claim 1 wherein R^2 is $-OR^6$ and R^6 is phosphoramidite and R^3 is a protecting group after removal of the hydroxyl protecting group of the product of step (d) to provide a free –OH group, and

(f) cleaving the oligomeric compound from the solid phase, removing the protecting groups and thereby converting the phosphotriester to a phosphodiester, and

(g) isolating the oligomeric compound.

28. A method for enzymatic synthesis of a compound according to claim 11 or 13 comprising the steps of:

(a) incubating a compound according to claim 1, wherein R^3 is a triphosphate, with an extendable OH group of the nucleotide or modified nucleotide at the 3'-end of a polynucleotide, oligonucleotide, or a modified oligonucleotide in the presence of terminal transferase or a polymerase, whereby the compound is attached to the extendable OH group, whereby pyrophosphate is released,

(b) optionally incubating the extendable OH group at the 3'-end of the product of step (a) with a nucleoside triphosphate or a modified nucleoside triphosphate in the presence of terminal transferase or a polymerase, whereby the nucleotide or modified nucleotide is attached to the 3'-OH group, whereby pyrophosphate is released,

(c) optionally repeating step (a) or (b) or both, and

(d) isolating the oligomeric compound.

29. A method for detecting a target nucleic acid in a sample comprising the steps of:

(a) providing a sample suspected of containing the target nucleic acid,

(b) providing a compound according to claim 11 or 13, which is essentially complementary to a part or all of the target nucleic acid,

(c) optionally amplifying the target nucleic acid with a template-dependent DNA polymerase and primers,

(d) contacting the sample with the compound under conditions for binding the compound to the target nucleic acid, and

(e) determining the binding product or the degree of hybridization between the target nucleic acid and the compound as a measure of the presence, absence or amount of the target nucleic acid.

30. The method according to claim 29 whereby in step (e) the degree of hybridization is determined by the quantity of the first or second fluorescent label that is released from the oligomeric compound hybridized to the target nucleic acid by exonuclease hydrolysis by the template-dependent DNA polymerase.

31. The method according to claim 30 further comprising the steps of:

performing a cycling step comprising an amplifying step and a hybridizing step, wherein the amplifying step comprises contacting the sample with primers to produce a an amplification product if target nucleic acid is present in said sample, wherein the hybridizing step comprises contacting the sample with a pair of probes, wherein at least one of the probes is an oligomeric compound comprising a monomeric unit comprising a six-membered ring, wherein the members of the pair of probes hybridize to the amplification product within no more than five nucleotides of each other, wherein a first probe of the pair of probes is labeled with a donor fluorescent label and wherein a second probe of the pair of probes is labeled with a corresponding acceptor fluorescent label; and

detecting the presence or absence of fluorescence resonance energy transfer between the donor fluorescent label of the first probe and the acceptor fluorescent label of the second probe, wherein the presence of fluorescence resonance energy transfer is indicative of the presence of the target nucleic acid in the sample, and wherein the absence of fluorescence resonance energy transfer is indicative of the absence of the target nucleic acid in the sample.

32. A method for determining the presence or the amount of a target nucleic acid in a sample comprising the steps of:

(a) providing a target nucleic acid from a sample to be analyzed,

(b) synthesizing double stranded complementary DNA from the target nucleic acid,

(c) amplifying the target nucleic acid in the presence of a compound according to claim 1 and nucleoside triphosphates whereby a labelled target nucleic acid is obtained,

(d) hybridizing the labelled target nucleic acid to an array of oligomeric compounds at a defined location, and

(e) measuring the fluorescence intensities at each defined location whereby the presence or the amount of the target nucleic acid is determined.

33. A kit of parts for determining a target nucleic acid in a sample comprising a template-dependent polymerase, a set of primers, nucleotides, and an oligomeric compound according to claim 11, wherein R^7 is a label.

34. A kit of parts for determining a target nucleic acid in a sample comprising a template-dependent polymerase, a set of primers, nucleotides, and an oligomeric compound according to claim 13, wherein R^7 is a label.

35. A kit of parts comprising a compound according to claim 8, nucleoside triphosphates, and a polymerase.

36. A kit of parts comprising a compound according to claim 9, nucleoside triphosphates, and a polymerase.